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EXAMINER	
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2676	

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9

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)	
	10/046,797	LUO, HUITAO	
	Examiner	**Art Unit**	
	Aaron M Richer	2676	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 05 March 2004.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-34 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-34 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 14 January 2002 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 8.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed December 4, 2003 have been fully considered but they are not persuasive.

2. As to rejected claims 1-11, new grounds of rejection have been applied because of the amendment of claim 1.

3. As to rejected claims 12-19, new grounds of rejection have been applied because of the amendment of claim 12.

4. As to rejected claim 20, the applicant argues that there is no motivation to combine the teachings of Catros (U.S. Patent 4,843,630) and Makram-Ebeid (U.S. Patent 6,332,034) because Catros is only concerned with contours and Makram-Ebeid is only concerned with regions. It is true that the written disclosure of Catros does not specifically mention a "region". It is also true that the written disclosure of Makram-Ebeid does not specifically mention a "contour". However, it is commonly known that contours and regions are very closely related, as contours are used to separate regions. Fig. 5a and 5b of Makram-Ebeid show an image that has been broken into regions using a number of contours. In col. 2, lines 39-56, Makram-Ebeid also discloses a segmentation method that delimits objects "by way of their edges". "Edges" in this case are forming a boundary of an object between two points, and are therefore performing the same function as the contours described by applicant. Since Catros is directed to contours, which define regions, and Makram-Ebeid is directed to regions, which are defined by contours (or "edges" according to the

disclosure), there is sufficient motivation to modify Catros in view of Makram-Ebeid to use a scale parameter in order to eliminate interfaces as taught by Makram-Ebeid.

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1, 2, 10, 12, 16, 18, and 25-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim (U.S. Patent 5,774,595) in view of Ikezawa (U.S. Patent 5,471,535).

1. Claim 1 recites "A system for processing boundary information of a graphical object, comprising: code for receiving a graphical image that comprises said graphical object wherein said graphical object is defined by at least said boundary information". Kim discloses "The contour image data representing the contour of an object is fed to a polygonal approximation block 100, a first and a second error detection blocks 120 and 150 and a curvature calculation block 160" (col. 3, lines 1-9). Figure 1 of Kim shows that contour, or boundary, image data of a graphical object is the input to the system.

Claim 1 further recites "code for detecting a plurality of contours between respective pairs of points of said graphical image". Kim discloses the step of "fitting the contour image with a plurality of line segments to provide a polygonal approximation of the contour image, each of the line segments joining two neighboring vertices" (col. 2, lines 7-10). This part of Kim's invention is also shown as element 100 of Figure 1.

Claim 1 further recites "code for determining a plurality of vertices from said boundary information, wherein respective contours, which are between adjacent vertices of said plurality of vertices detected by said code for detecting, approximate respective edges of said boundary information within a distortion criterion". Kim discloses "determining a number of vertices on the contour image" (col. 2, lines 6-7). Kim further discloses "calculating a second error which is the number of mismatched pixels between the reconstructed contour segment and its corresponding contour segment [and] comparing the second error with a predetermined threshold value" (col. 2, lines 27-31). Kim also discloses "if the second error is equal to or larger than the threshold value... repeating the steps...for all the line segments formed by the vertices determined" (col. 2, lines 31-42). This threshold value reads on the "distortion criterion" of Claim 1, and the method described by Kim assures that the contours detected will be within this error threshold.

Kim does not disclose individual contours being detected responsive to respective user input of a user. Ikezawa, however, discloses a user specifying points to be used (col. 3, lines 56-67; col. 4, lines 1-14). The motivation for this is so that a user can specify a portion of the image to separate (col. 5, lines 42-45). It would have been obvious to one skilled in the art to modify Kim to be responsive to user input in order to specify a portion of an image to separate as taught by Ikezawa.

2. Claim 2 recites "The system of claim 1 further comprising: code for creating an approximated boundary utilizing at least said graphical image, said

plurality of vertices, and said code for detecting". Kim discloses "fitting the contour image with a plurality of line segments to provide a polygonal approximation of the contour image" (col. 2, lines 7-10).

3. Claim 10 recites "The system of claim 1 wherein said code for determining a plurality of vertices only analyzes vertices from a searchable set of vertices". Kim discloses "determining a number of vertices on the contour image" (col. 2, lines 6-7). This disclosure reads on a "searchable set of vertices" because any vertex could be a part of a "searchable set of vertices". This argument also reads on claim 18, which claims the method implemented by the system in claim 10.

4. Claim 12 recites "A method for processing boundary information of a graphical object, comprising: receiving a graphical image that comprises said graphical object, wherein said graphical object is defined by at least said boundary information". Kim discloses "The contour image data representing the contour of an object is fed to a polygonal approximation block 100, a first and a second error detection blocks 120 and 150 and a curvature calculation block 160" (col. 3, lines 1-9). Figure 1 of Kim shows that contour, or boundary, image data of a graphical object is the input to the system.

Claim 12 further recites "determining a plurality of vertices from said boundary information, wherein adjacent vertices of said plurality of vertices are associated with respective contours that approximate respective edges of said boundary information within a distortion criterion, wherein said respective contours are detected by analysis of said graphical image by a predetermined function". Kim discloses "determining a number of vertices on the contour image"

(col. 2, lines 6-7). Kim further discloses "calculating a second error which is the number of mismatched pixels between the reconstructed contour segment and its corresponding contour segment [and] comparing the second error with a predetermined threshold value" (col. 2, lines 27-31). Kim also discloses "if the second error is equal to or larger than the threshold value... repeating the steps...for all the line segments formed by the vertices determined" (col. 2, lines 31-42). The threshold value disclosed by Kim reads on the "distortion criterion" of Claim 1, and the method disclosed by Kim assures that the contours detected will be within this error threshold. Kim further discloses "fitting the contour image with a plurality of line segments to provide a polygonal approximation of the contour image, each of the line segments joining two neighboring vertices" (col. 2, lines 6-10). This disclosure reads on a predetermined function to detect contours.

Claim 12 further recites "encoding at least said plurality of vertices in a data structure to represent said boundary information". Kim discloses "providing the position of the two vertices of a line segment as segment data" (col. 2, lines 10-11) and "coding the set of quantized transform coefficients and the segment data of the contour segment" (col. 2, lines 25-33).

Kim does not disclose individual contours being detected responsive to respective user input of a user. Ikezawa, however, discloses a user specifying points to be used (col. 3, lines 56-67; col. 4, lines 1-14). The motivation for this is so that a user can specify a portion of the image to separate (col. 5, lines 42-45). It would have been obvious to one skilled in the art to modify Kim to be

responsive to user input in order to specify a portion of an image to separate as taught by Ikezawa.

5. Claim 16 recites "The method of claim 12 wherein said determining comprises identifying a point of said boundary information that is associated with a greatest amount of curvature". Kim discloses "The extra vertex selection block 170 compares the curvatures for the target pixels from the curvature calculation block 160 to select therefrom a target pixel, e.g., F shown in FIG. 4A, having the largest curvature" (col. 5, lines 17-22).

6. As to claims 25 and 29, Kim in view of Ikezawa discloses the system of claim 1. Ikezawa further discloses a system where user input is different for individual ones of the contours (col. 3, lines 56-67; col. 4, lines 1-14; the user specifies many points and fixes edges individually).

7. As to claim 26, Kim in view of Ikezawa discloses the system of claim 25. Ikezawa further discloses a system where user input selects an area of the graphical image wherein searching for contours is performed (col. 11, lines 60-67; col. 12, lines 1-5).

8. As to claim 27, Kim in view of Ikezawa discloses the system of claim 26. Ikezawa further discloses a system wherein the graphical image has an associated area and the selected area comprises an area less than an entirety of the area of the graphical image (col. 11, lines 60-67; col. 12, lines 1-5; also see fig. 11b).

9. As to claim 28, Kim in view of Ikezawa discloses the system of claim 26. Ikezawa further discloses a system wherein the user input selects, for individual

ones of the contours at least one of the respective vertices (col. 3, lines 56-67; picking and fixing an edge position reads on picking a vertex) and a width of the area (col. 11, lines 60-67; col. 12, lines 1-5; the "range" of the area includes height and width).

10. Claims 3-5, 7-9, 13-14, 17, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim in view of Ikezawa and further in view of Catros (U.S. Patent 4,843,630).

11. Claim 3 recites "The system of claim 1 wherein the code for detecting comprises a predetermined function is operable to calculate gradients associated with said graphical image". Kim in view of Ikezawa discloses the system of claim 1. Neither Kim nor Ikezawa discloses a predetermined function operable to calculate gradients. Catros, however, discloses a method that "uses as starting data that data representing the grey levels of the image of the amplitudes and/or orientations of the gradients which are already calculated for elaborating the image of the contours" (col. 2. lines 42-50). Catros further discloses that an advantage to using gradients is that "This data better represents the contours than the initial luminance data" (col. 2. lines 42-50). Catros is using calculated gradient values, which implies that the calculation of gradient values is inherent to the proper function of this method. It would have been obvious to one skilled in the art to modify Kim in view of Ikezawa to use gradient values for contour detection in order to better represent contours as taught by Catros.

12. Claim 4 recites "The system of claim 3 wherein said code for detecting is operable to determine a shortest path between said pair of points, wherein said

shortest path is weighted by said calculated gradients". It was established in the rejection of Claim 3 above that Catros' method uses amplitudes of gradients to find contours. In addition, Catros discloses "The present invention also uses a search algorithm known under the name of Moore-Dijkstra algorithm which seems better adapted for providing a solution to one of the specific problems raised by the invention, this method consisting of searching for the existence of a contour passing through two points A and B, bringing this problem down to that already solved by this algorithm and for finding the shortest path in a graph between two tops" (col. 2, lines 50-59). In this method, Catros is using the amplitudes of gradients as weights, and reducing the contour detection problem to a "shortest path" problem. This argument also reads on claim 13, which claims the method implemented by the system in claim 4.

13. Claim 5 recites "The system of claim 4 wherein said code for detecting limits its determination of the shortest path to a rectangular area defined in part by a width parameter". Catros discloses "The search space in the image memory is defined in the way shown in FIG. 1, where there is inserted between two points A and B, marking the ends of a discontinuity in a contour C of the image, a square of side D equal to the distance separating the two points A and B and oriented in the plane so that points A and B are disposed on two opposite sides of the square in the middle thereof" (col. 2, lines 63-68; col. 3, lines 1-2). Also see Figure 1 of Catros for further disclosure of this square. The "width parameter" in this disclosure is set to the length of side D. This argument also

reads on claim 14, which claims the method implemented by the system in claim 5.

14. Claim 7 recites "The system of claim 1 wherein said code for detecting implements a Rubberband function in executable instructions". A "Rubberband function" is defined in page 6, lines 14-22 of the specification as " [a] function [that] utilizes two vertices, the supplied parameters and the underlying graphical image to detect a contour, B'=(b'.sub.0, b'.sub.1, b'.sub.2, b'.sub.3, . . . b'.sub.n), where b'.sub.i is the i.sup.th pixel of the detected contour and b'.sub.0=v.sub.1 and b'.sub.n=v.sub.2. The contour (B') is detected by computing the shortest path between vertices (v.sub.1 and v.sub.2) based upon weights generated by the gradient of the underlying graphical image. This argument also reads on claim 30, which claims the method implemented by the system in claim 7.

"Moreover, the Rubberband function models the image as a graph in which each pixel is a vertex and each vertex has only 8 edges linking to its 8 neighboring pixels (as is depicted by vertex 501 in FIG. 5)..."

Catros discloses "The method consists of the steps of defining a search window between each of the facing ends of the disjointed contour elements, considering in the window the different image points as nodes on a graph, determining the elementary cost associated with each path connecting each node to its adjacent nodes from amplitude and orientation information of the luminance function used for detecting the contours, and determining the optimum path by following, from the costs obtained, a line for which the luminance gradient of the detected points appears to be a maximum" (col. 1, lines 40-54).

Catros further discloses "each node P.sub.i inside the search window F is connected to each of its eight neighbors P.sub.j by an arc (i,j) to which is assigned a cost M.sub.i =C.sub.ij corresponding to the cost associated with the passage from a point P.sub.i to an adjacent point P.sub.j. Thus, by defining the characteristic costs for each arc subtended between two adjacent nodes, an overall cost may be calculated for determining the shortest path for going from point A to point B" (col. 3, lines 2-15).

The "amplitudes" of gradients in the method disclosed by Catros are used in the same way that the "weighted gradients" are used in the "Rubberband function" of claim 7 and so the method of Catros reads on the "Rubberband function of claim 7.

15. Claim 8 recites "The system of claim 1 wherein said code for determining only analyzes points of said boundary information that are associated with respective edges that are less than a heuristic value". Catros discloses "if the coding cost of the shortest path is less than a given threshold, this path is considered as the corresponding to the desired bridging, if not, there is no bridging possible between the two points" (col, 2, lines 59-63). The method disclosed by Catros would eliminate edges larger than a threshold, which reads on the heuristic value of claim 8. This argument also reads on claim 17, which claims the method implemented by the system in claim 8.

16. Claim 9 recites "The system of claim 1 wherein said code for determining only analyzes vertex pairs associated with edges of an edge set that is a weighted acyclic graph". Catros discloses "The method consists of the steps of

defining a search window between each of the facing ends of the disjointed contour elements, considering in the window the different image points as nodes on a graph, determining the elementary cost associated with each path connecting each node to its adjacent nodes from amplitude and orientation information of the luminance function used for detecting the contours, and determining the optimum path by following, from the costs obtained, a line for which the luminance gradient of the detected points appears to be a maximum" (col. 1, lines 40-54). This meets the definition of a "weighted acyclic graph" because it uses weighted paths, in this case weighted by gradient amplitude, to determine the shortest path between two nodes.

17. Claims 6 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim in view of Ikezawa and Catros and further in view of Makram-Ebeid (U.S. Patent 6,332,034).

18. Claim 6 recites "The system of claim 3 wherein said calculated gradients are calculated over respective spatial areas of said graphical image limited by a scale parameter". Kim in view of Ikezawa and Catros obviates the system of claim 3. Catros discloses a method of calculating gradients, as described in the rejection to claim 3. Neither Kim nor Catros nor Ikezawa discloses gradients limited by a scale parameter.

Makram-Ebeid, however, discloses "The merging of two adjacent regions is possible only in the case in which the Energy function is minimized. This Energy function comprises two terms: a first term which takes into account the intensity variance in each region of the image and a second term which takes

into account the total length of the boundaries in the image, weighted by a so-called scale parameter .lambda.. The execution of the algorithm consists first of all in assigning the value 1 to the scale factor .lambda. and in merging two adjacent regions, if any, which minimize the Energy function. The resultant regions are then re-organized by elimination of the interface of the two merged regions, the terms of the Energy function are calculated again and a new attempt for a merger is made, utilizing the scale factor .lambda.=1. This operation is repeated until there is no longer any region having an adjacent region for a merger when the scale factor .lambda.=1. After each merger the resultant regions are re-organized by elimination of the interfaces. Subsequently, the same operations are performed with the scale parameter .lambda.=2, etc., until the Energy function cannot be further minimized" (col. 1, lines 45-66).

Here, Makram-Ebeid is disclosing a method of merging regions, in which each region and contour is created at a certain scale parameter. The scale parameter limits the size of the area that can be merged into one region or made into one contour. The motivation for using this method is that it "eliminates the largest possible number of interfaces to merge adjacent regions whose intensities are practically identical" (col. 1, lines 37-45). It would have been obvious to one skilled in the art to modify Kim in view of Ikezawa and Catros to include a scale parameter to merge similar adjacent regions to aid in correctly identifying contours. This argument also reads on claim 15, which claims the method implemented by the system in claim 6.

19. Claims 11 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim (U.S. Patent 5,774,595) in view of Ikezawa and further in view of Kim (U.S. Patent 6,055,337). In the following rejection, Kim (U.S. Patent 5,774,995) shall be referred to as Kim ('595) and Kim (U.S. Patent 6,055,337) shall be referred to as Kim ('337).

20. Claim 11 recites "The system of claim 10 wherein said searchable set of vertices only includes: (a) vertices associated with curvature greater than a first heuristic value and (b) vertices recursively grown by maximizing distances between adjacent vertices subject to the following constraints: (i) said maximizing distances are less than a second heuristic value and (ii) each contours between adjacent vertices detected by said code for detecting approximate respective edges of said boundary information within a distortion criterion".

Kim ('595) discloses "If the distance D.sub.max between the line segment AB and the farthest point, e.g., C, is greater than a predetermined threshold value, the point C becomes a vertex. This procedure is repeated, as shown in FIG. 2C, until D.sub.max for each segment becomes smaller than the predetermined threshold value TH1." (col. 3, lines 13-24). This method holds maximizing distances to below a threshold, which reads on the "heuristic value" of claim 11.

Kim ('595) further discloses "calculating a second error which is the number of mismatched pixels between the reconstructed contour segment and its corresponding contour segment [and] comparing the second error with a predetermined threshold value" (col. 2, lines 27-31). Kim ('595) also discloses "if

the second error is equal to or larger than the threshold value... repeating the steps...for all the line segments formed by the vertices determined" (col. 2, lines 31-42). This threshold value reads on the "distortion criterion" of Claim 11, and the method described by Kim ('595) assures that the contours detected will be within this error threshold.

Neither Kim ('595) nor Ikezawa discloses selecting vertices with curvature greater than a heuristic value. Kim ('337), however, discloses "Once the curvatures at the contour pixels are determined for the contour segment, the secondary vertex detection block 120 selects all contour pixels on the contour segment having curvatures larger than a predetermined threshold value C.sub.M" (col. 4, lines 40-56). The threshold disclosed by Kim ('337) reads on the "heuristic value" of claim 11.

Kim ('337) discloses that "it is inevitable to compress or reduce the volume of data through the use of various data compression techniques". This discloses a motivation for reducing the number of vertices to be encoded. It would have been obvious to one skilled in the art to modify Kim ('595) in view of Ikezawa to use a curvature threshold to select vertices in order to reduce the number of vertices to encode as taught by Kim ('337). This argument also reads on claim 19, which claims the method implemented by the system in claim 11.

21. Claims 20-23 and 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Catros in view of Makram-Ebeid (U.S. Patent 6,332,034).

22. Claim 20 recites "A method for processing boundary information associated with an object in a graphical image, said method comprising:

identifying two vertices in said graphical image". Catros discloses "a method of bridging between disjointed contour elements in an image by searching for an optimum bridging path between the facing ends of the disjointed contour elements" (col. 1, lines 40-54). These points on disjointed contour elements read on vertices, because they are points on contours to be joined by "bridging".

Claim 20 further recites "detecting a plurality of contours between said two vertices by determining a respective shortest path between said two vertices, said respective shortest path being weighted by gradient calculations of said graphical image over regions defined at least by a scale parameter, and each contour of said plurality of contours being associated with a respective scale parameter of a plurality of scale parameters". Catros discloses a method of determining a shortest path between vertices by gradient weighting, as described in the rejections to claims 3 and 4. Catros does not disclose regions defined by a scale parameter, nor does Catros disclose contours being associated with a scale parameter.

Makram-Ebeid, however, discloses "The merging of two adjacent regions is possible only in the case in which the Energy function is minimized. This Energy function comprises two terms: a first term which takes into account the intensity variance in each region of the image and a second term which takes into account the total length of the boundaries in the image, weighted by a so-called scale parameter .lambda.. The execution of the algorithm consists first of all in assigning the value 1 to the scale factor .lambda. and in merging two adjacent regions, if any, which minimize the Energy function. The resultant

regions are then re-organized by elimination of the interface of the two merged regions, the terms of the Energy function are calculated again and a new attempt for a merger is made, utilizing the scale factor .lambda.=1. This operation is repeated until there is no longer any region having an adjacent region for a merger when the scale factor .lambda.=1. After each merger the resultant regions are re-organized by elimination of the interfaces. Subsequently, the same operations are performed with the scale parameter .lambda.=2, etc., until the Energy function cannot be further minimized" (col. 1, lines 45-66).

Here, Makram-Ebeid is disclosing a method of merging regions, in which each region and contour is created at, and therefore associated with a certain scale parameter. The motivation for using this method is that it "eliminates the largest possible number of interfaces to merge adjacent regions whose intensities are practically identical" (col. 1, lines 37-45). It would have been obvious to one skilled in the art to modify Catros to include a scale parameter to merge similar adjacent regions to aid in correctly identifying contours.

Claim 20 further recites "selecting an optimal scale parameter from said plurality of scale parameters by determining a scale parameter from said plurality of scale parameters that minimizes variance between regions defined by its respective contours". The disclosure by Makram-Ebeid above describes incrementing of a scale parameter until an optimum level is reached. It also describes an Energy function that includes a variance term, which is minimized based on the scale parameter.

23. Claim 21 recites "The method of claim 20 wherein said method further comprising: encoding a boundary object utilizing said two vertices and said optimal scale parameter". Catros discloses bridging "between each of the facing ends of the disjointed contour elements" (col. 1, lines 40-54). This bridging forms a new contour between two points, which reads on "encoding a boundary object utilizing two vertices", as recited by claim 21. Catros does not disclose an optimal scale parameter. Makram-Ebeid discloses an optimal scale parameter, as described in the rejection of claim 20. It would have been obvious to modify Catros to utilize an optimal scale parameter to encode a boundary object in order to merge similar adjacent regions to aid in correctly identifying contours.

24. Claim 22 recites "The method of claim 20 wherein said detecting further comprising: incrementally detecting a contour of said plurality of contours by utilizing a threshold value, wherein said shortest path is determined by a graph searching process that limits searching of paths to distances less than said threshold value". Catros discloses "if the coding cost of the shortest path is less than a given threshold, this path is considered as the corresponding to the desired bridging, if not, there is no bridging possible between the two points" (col, 2, lines 59-63). The bridging disclosed by Catros reads on the contour detection recited in claim 22.

25. Claim 23 recites "The method of claim 20 wherein said detecting a plurality of contours is operable to only select contours within a rectangular area defined by a width parameter and said two vertices". Catros discloses "The search space in the image memory is defined in the way shown in FIG. 1, where

there is inserted between two points A and B, marking the ends of a discontinuity in a contour C of the image, a square of side D equal to the distance separating the two points A and B and oriented in the plane so that points A and B are disposed on two opposite sides of the square in the middle thereof" (col. 2, lines 63-68; col. 3, lines 1-2). Also see Figure 1 of Catros for further disclosure of this square. Since a square is a type of rectangle, this square reads on the rectangle in claim 23. The "width parameter" in this disclosure is set to the length of side D.

26. As to claim 31, Catros in view of Makram-Ebeid discloses the method of claim 20. Catros further discloses a method wherein detected contours approximate respective edges of the boundary information (col. 1, lines 22-29; the invention approximates edges in areas it is not clear where the edges are).

27. As to claim 32, Catros in view of Makram-Ebeid discloses the method of claim 31. Catros further discloses a method wherein the edges of the boundary information exist before detecting (col. 2, lines 42-48; the invention uses existing data about gradients to detect contours).

28. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Catros in view of Makram-Ebeid as applied to claims 20-23 above, and further in view of Luo.

Claim 24 recites "The method of claim 23 wherein said width parameter and said two vertices are selected by a user interface". Catros in view of Makram-Ebeid obviates the method of claim 23 above. Neither Catros nor Makram-Ebeid disclose a user interface for selecting width parameters and two

vertices. Luo discloses "In practice, both the width and height of the global search stripe can be determined by the user in an interactive way, according to the motion of video object" (page 8, lines 1-8). See Figure 4 of Luo for an example of how the width and height can be limited. Luo further discloses "In our system, the user defines a video object by specifying its contour on multiple anchor frames" (page 2, lines 3-19).

The height of the local search stripe disclosed by Luo reads on the width parameter of claim 24. The contour specified by the user in Luo reads on the two vertices of claim 24, because a number of vertices define a contour. Luo discloses that "fully automatic segmentation is difficult" (page 1, lines 27-29), giving the motivation for including a user interface. It would have been obvious to one skilled in the art to modify Catros and Makram-Ebeid to include a user interface in order to simplify the task of segmentation as taught by Luo.

Conclusion

3. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will

the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

29. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents are cited to further show the state of the art with respect to processing boundary information in general:

U.S. Patent 5,559,901 to Lobregt

U.S. Patent 6,621,929 to Lai

U.S. Patent 6,041,138 to Nishida

U.S. Patent 6,031,935 to Kimmel

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron M Richer whose telephone number is (703) 305-5825. The examiner can normally be reached on weekdays from 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on (703) 308-6829. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AMR
5/13/04

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